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(71) Applicant

David Edwin Gillmor,  
65 Dixon Street, Irlam, Manchester M30 6AD

(72) Inventor

David Edwin Gillmor

(74) Agent and/or Address for Service

David Edwin Gillmor,  
65 Dixon Street, Irlam, Manchester M30 6AD

(51) INT CL<sup>4</sup>

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(56) Documents cited

GB A 2114901 US 4542897 US 3929335  
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(58) Field of search

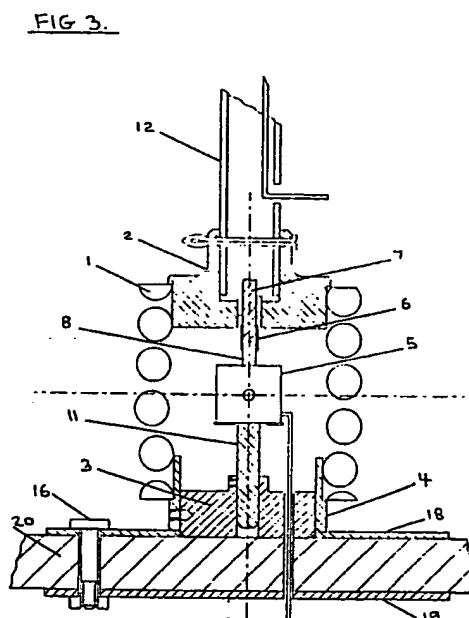
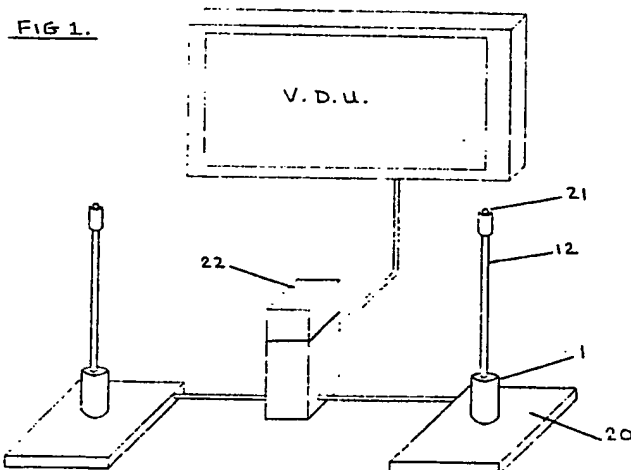
A6M

Selected US specifications from IPC sub-class A63B

## (54) Computer game driven by exercise machine

(57) An exercise machine consisting of a main operating arm 12 spring loaded by a concentric helical spring 1 mounted on a firm base 20 is linked to and thereby drives the operating arm 8 of an electrical/electronic switch 5 similar to and performing the same functions as a computer "joystick" of the proportional type so that the machine can be used in place of a computer joystick to play computer games.

Provision is made to change the type of physical effort required by changing the configuration of the main operating arm 12 and to change the degree of physical effort required to produce a given result at the computer by means of an electrical/electronic unit 22 which adjustably amplifies or attenuates the signals output by the switch 5 before inputting them to the computer.



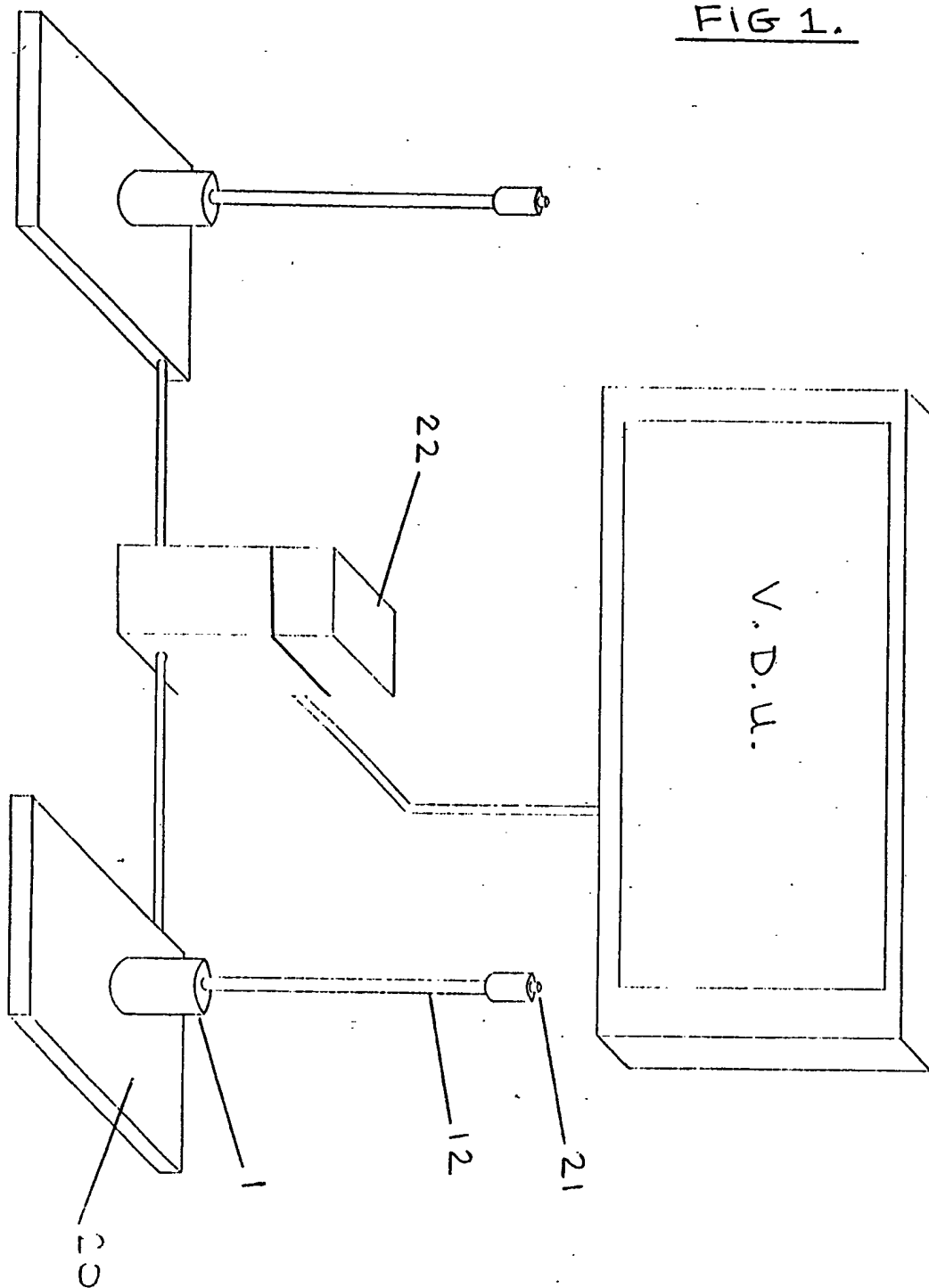
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FIG 1.



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FIG 2.

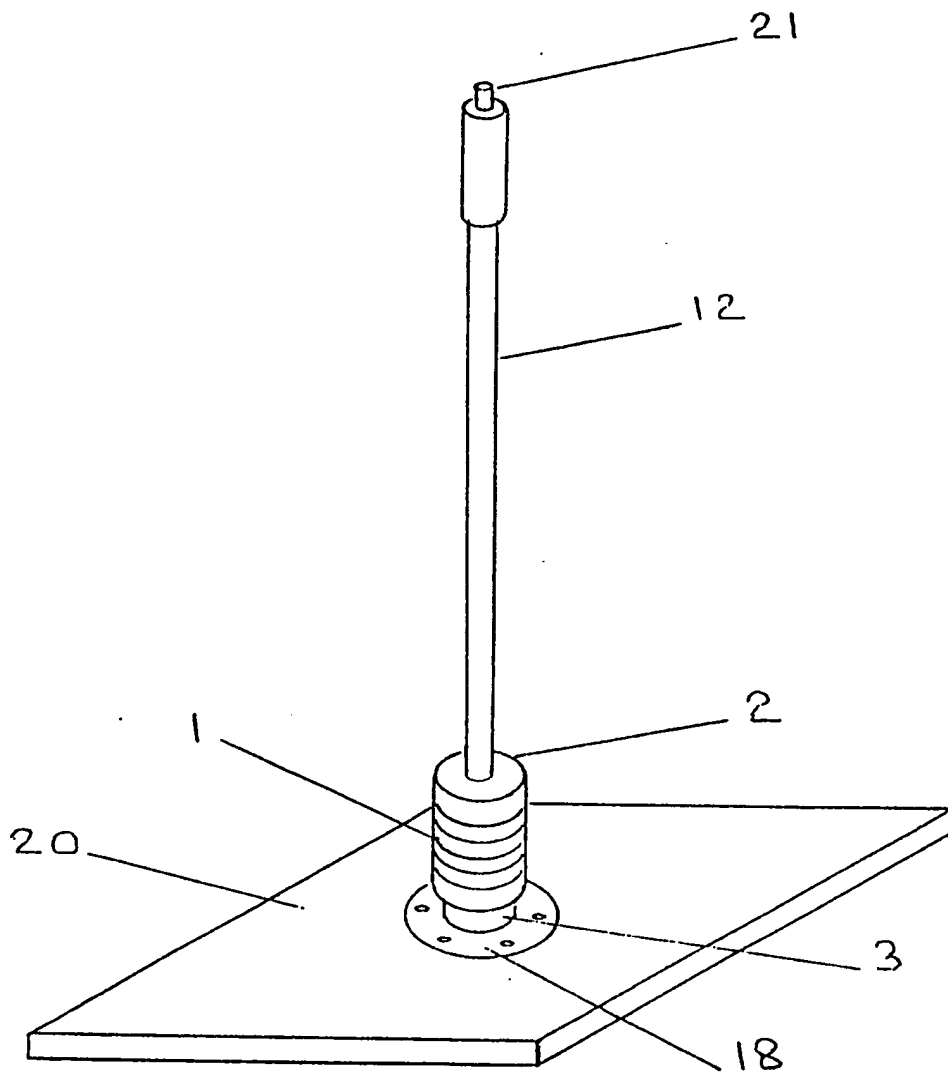
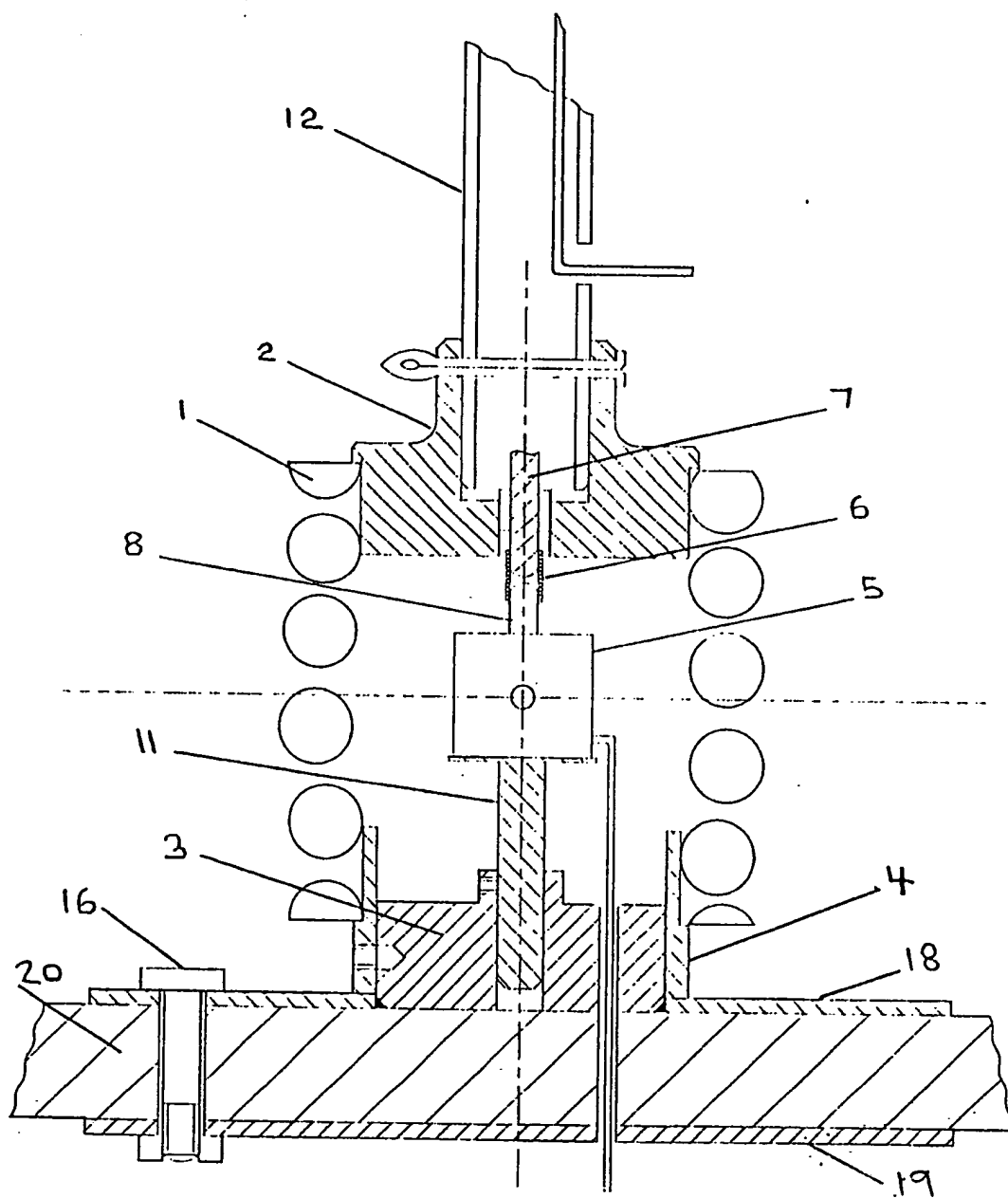


FIG 3.



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FIG 4.

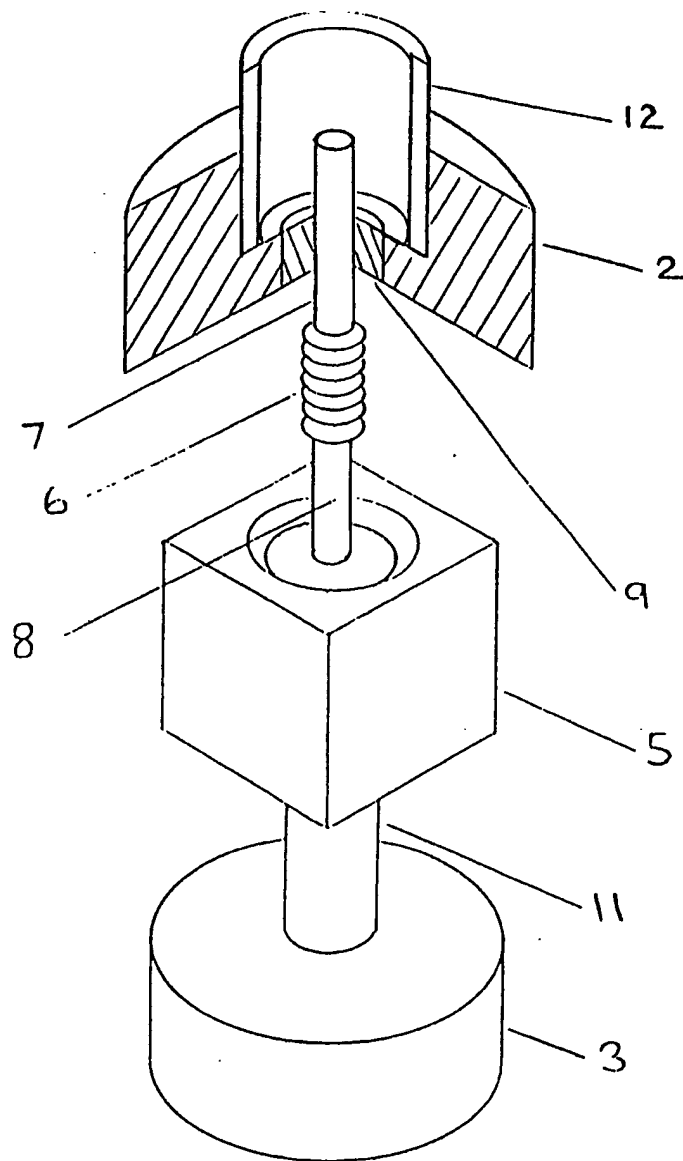


FIG 5.

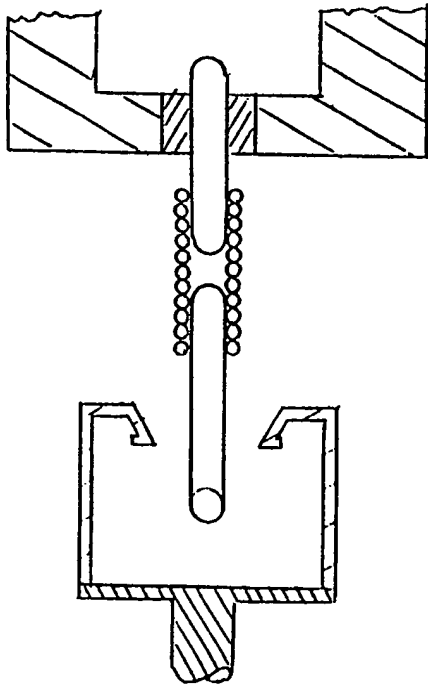


FIG 6

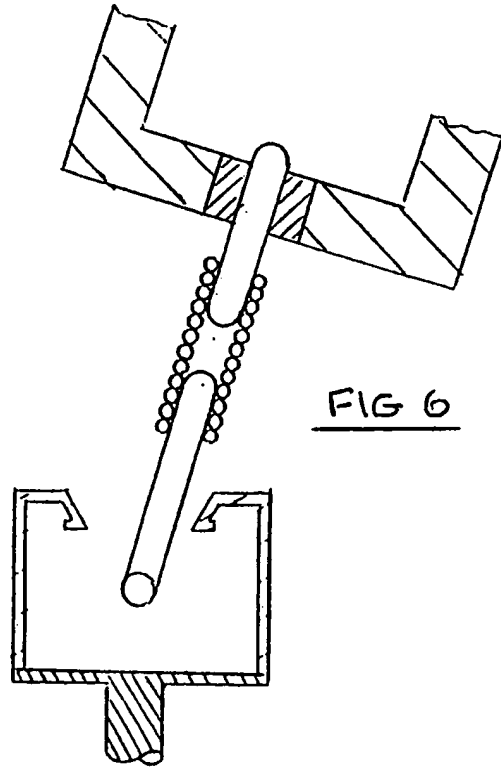
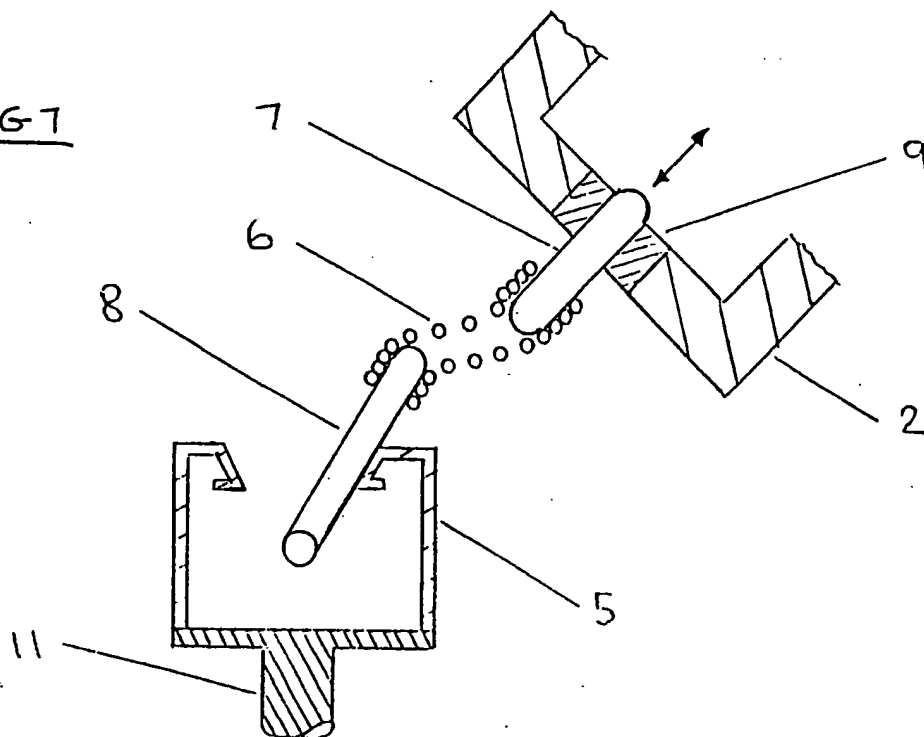


FIG 7



## SPECIFICATION

### Computer linked exercise machine

- 5 This invention relates to the linking of exercise machines to computer games systems.

Existing exercise machines are extremely boring to use because the physical actions required are necessarily simple, repetitive and without immediate purpose other than their completion, thus requiring no mental effort other than the exercise of enough will power to continue. In brief, they present no mental challenge to maintain the interest of the user and consequently tend to be self-defeating by discouraging the extended use necessary to benefit from them.

Also, due to the lack of mental effort required, existing machines do little or nothing to develop mental/muscular co-ordination without which mere strength and stamina are of little value.

The invention seeks to overcome these vital deficiencies by linking an exercise machine to a computer games system so that the exercise machine can be used in place of the computer "joysticks" commonly used, to play any of the many suitable computer games which are already available.

By thus providing the user with a series of immediate objectives which must be achieved by performing an appropriate physical action in order to achieve the overall objective of completing/winning the game in use, the immediate and overall challenges presented will retain the user's interest whilst the considerable degree of mental/muscular co/ordination required by many computer games will serve to develop such co-ordination.

According to the invention there is provided a system comprising an exercise machine linked with a computer games system through a transducer which converts the physical operation of the exercise machine into an electrical signal suitable for use as an input signal to operate the computer games system.

The exercise machine may be any machine in which physical effort on the part of the user produces movements or forces which represent some aspect of exercise, for example in the lifting of moving of weights, turning wheels, moving arms, or the like. Such movements or forces may be exerted against opposing forces in a moving or static fashion. Examples of exercise machines include, rowing machines, bicycles, gym training equipment etc.

The computer games system may be any such system in which the player or players provide the input to the games operation by one or more variable electrical inputs. Such electrical inputs would usually be variable in respect of their voltage, but any other input which is recognizable by the computer system may be employed if desired. Examples of such

games include, tennis, squash, football, space combat, flight and flight simulators, racing, etc.

The transducer, for correcting the output movements or forces of the exercise machine when in use, may be any device which converts the physical input into an electrical output. This may be such as to operate by variation of any electrical characteristic, for example resistance, capacitance, inductance, or even photoelectric properties. The devices for this purpose are well known in themselves, for example potentiometers.

It is preferred to use a variable resistor, or potentiometer as a transducer because this is usually least expensive, but this is not essential. An alternative, especially for exercise machines which result in producing a force rather than a movement, can be a load-cell or similar device which converts the force or pressure exerted on it into an output voltage which is related to the force exerted.

A preferred arrangement is that in which the operation of the exercise machine acts upon a computer joystick of the proportional type (ie, a joystick device in which movements of a control element—usually an arm, rod or lever—causes variation of one or more electrical outputs in a variable manner, as distinct from a simple "on or off" manner).

The invention therefore consists of a simple but highly versatile exercise machine by way of a main operating arm or lever spring loaded by means of a concentric helical spring, mechanically linked to and thereby driving the operating arm of an electrical/electronic switch similar to and performing the same functions as a computer "joystick" of the proportional type so that the electrical/electronic outputs of this switch can be used to drive a computer games system and thereby play any suitable computer game by appropriate movements of the main operating arm.

Provision is made to determine the type of physical action required, e.g. "push and pull" or "lift and lower", by changing the configuration of the main operating arm by substitution or modification.

Advantageously, Provision is also made to adjust the degree of physical effort required to produce a given result at the computer by amplifying or attenuating the outputs of the electrical electronic switch before inputting them to the computer. this not only allows the effort requirement to be preset to suit the physical capabilities of individual users but also allows, where the game in use requires or allows two players, two players of unequal physical capabilities to complete on equal terms. Such adjustment can be made by stepwise adjustment means or by a continuously variable means, as desired.

A specific embodiment of the invention will now be described by way of example, with reference to the accompanying drawings in

which:

Figure 1 is a schematic diagram of the invention connected to a computer games system.

5 Figure 2 shows the main operating arm or lever.

Figure 3 shows the mechanical details of the invention.

10 Figure 4 illustrates the mechanics of the main operating lever.

Figures 5, 6 and 7 illustrate the operation of the mechanics in three conditions:-

Fig. 5) unloaded

Fig. 6) normal working range

15 Fig. 7) overtravel

Referring to the drawings, a main operating arm or lever 12, shown in it's simplest form as a simple tube lever but capable of other configurations, is dismountably attached to a strong helical main spring 1 by means of an upper end cap 2 which is permanently attached to the upper end of the main spring 1 and so formed as to provide on it's upper side a socket concentric with the main spring 1 for the main operating arm 12.

This upper end cap 2 is also through bored concentric with the main spring 1 in order to accomodate a bushing 9 within which a small short connecting rod 7 is free to slide.

The lower end of this connecting rod 7 is attached by means of a small flexible helical spring 6 to the upper end of the operating arm 8 of an electrical/electronic switch 5 similar to and performing the same functions as a computer "joystick" of the proportional type. The purpose of the sliding rod 7 and flexible helical spring 6 is to enable the angular travel of the main arm 12 to exceed the maximum angular travel of the switch operating arm 8 without damage.

The switch 5 is mounted within the main spring 1 on an adjustable support 11 so that the pivoting point of the switch operating arm 8 co-incides with the pivoting point of the main arm 12.

The lower end of the main spring 1 is permanently attached to a heavy sleeve insert 4 which closely fits over and is dismountably attached to a cylindrical stub or pedestal 3. This stub or pedestal 3 is through bored concentric with the main spring 1 to provide a socket within which the switch support 11 is free to slide but can be temporarily locked in any chosen position as required to correctly locate the pivoting point of the switch operating arm 8.

The lower side of the stub or pedestal 3 is permanently attached to a wide flange 18, which is dismountably attached to a suitably large base 20 by means of through bolts 16 and a backing plate 19.

A "Firing Button" as required by many computer games is provided by means of a push-button electrical switch 21 which can be

dismountably mounted at any convenient position on the main arm 12 by means of a spring clip or used independently.

The electrical/electronic outputs of this "Firing Button" 21 and the switch 5 are taken to an "Effort Adjusting Unit" 22 where the outputs of the switch 5 can be amplified or attenuated at will in order to adjust the degree of physical effort required to produce any given input to the computer, as required to "Play" the computer game in use, before being forwarded to the computer.

#### CLAIMS

80 1. An exercise machine provided with a means of linking the machine to and thereby using the machine to drive a computer games system.

85 2. A computer games system linked to and thereby driven by any machine which requires sufficient physical effort to constitute an exercise machine.

90 3. Any machine which requires sufficient physical effort to operate it to constitute an exercise machine, which is linked to and can thereby be used to drive a computer games system.

4. Any exercise machine which provides a means of using it to play computer games.

95 5. Any machine as claimed in claim 4 which provides a means of using it to play computer games which require the use of a "firing button".

100 6. An exercise machine consisting of a main operating arm or lever of variable configuration spring loaded by means of a concentric helical spring.

105 7. An exercise machine as claimed in claim 6 linked to an electrical electronic "joystick" similar to and performing functions similar to the functions performed by computer joysticks.

110 8. A machine as claimed in claim 7 in which the linkage consists of a sliding connecting rod acting in combination with a flexible helical spring.

9. A machine as claimed in claim 7 which provides a "firing button" as required by many computer games, by way of a dismountable push-button electrical switch.

115 10. An exercise machine substantially as described herein with reference to Figs. 1-5 of the accompanying drawings.

120 11. An exercise machine as claimed in claim 6 in which the type or degree of physical effort required to operate the machine can be changed by changing the configuration of the main operating arm.

125 12. An exercise machine as claimed in claim 6 wherein the degree of physical effort required to operate it can easily be broadly adjusted by changing the helical spring.

130 13. An exercise machine as claimed in claim 4 wherein the degree of physical effort required to play a computer game is adjust-



able by electronic means.

14. A machine as claimed in claim 7  
wherein the pivoting point of the operating  
arm of the electrical/electronic switch coin-  
cides with the pivoting point of the main oper-  
ating arm

15. A machine as claimed in claim 7  
wherein the pivot point of the operating arm  
of the electrical/electronic switch is adjustable  
relative to the pivot point of the main operat-  
ing arm.

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